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GENERAL ANALYTICAL METHODS

I. Fractionation:

Extraction solvents are partially removed on a rotary evaporator (50°C). The residual solvent is transferred to a 10 ml flask using a disposable glass pipette and evaporated to dryness under purified nitrogen at 40°C . A small volume of n-heptane is added and the extract placed on a pre-washed (4 column volumes of n-heptane) silica-gel chromatographic column (1 x 20 cm) of activated silica gel (heated for 12 hours at 275°C). Saturated paraffins are eluted with 30 ml of n-heptane with aromatic-naphthenic hydrocarbons eluted with 30 ml of benzene. Fractions are taken to dryness under a stream of pre-purified nitrogen.

II. Gas Chromatographic Resolution:

Each of the resulting fractions were taken up in 10 to 50 μl portions were injected directly into a gas chromatography. The isolated hydrocarbons were resolved on a 400 m x 0.025 cm capillary stainless steel column coated with Igepal CO-880 or on a stainless steel capillary column 200 m x 0.025 cm coated with Apiezon-L.

Columns were temperature programmed at $2^{\circ}\text{C}/\text{min}$ from 80°C to 280°C following an initial hold of 15 minutes. Helium carrier flow rates were at 15 ml/min. Hydrogen flame detectors were used and maintained at 300°C . The injector ports were at 300°C also.

III. Gas Chromatographic-Mass Spectrometric Characterization:

All hydrocarbon compounds separated by gas chromatography were eluted directly into a duPont 21-491 double focusing mass spectrometer for structural characterization. Routine sensitivity is about 1-10 ng of eluted component to obtain a recognizable spectrum. All spectra were collected at 70 eV in

an ion source operated at 200°C.

Analogue output was processed by use of a PDP-12 LDP computer to provide information as to fragment patterns and relative intensities of ions produced to aid in compound identification. PFK was employed as the internal resolution standard.

IV. Organic type analysis by direct computer data reduction:

A mass spectrometric procedure was also employed, in specific cases where identification of a petroleum source is in doubt, by directly determining up to 25 saturated and aromatic compound types. The technique resolves the mass spectra into saturates and aromatics spectra from 100°C to 400°C without need for any physical separation. The entire composition is accounted for in terms of paraffins, non-condensed cycloparaffins, 2-ringed condensed cycloparaffins, 3-ringed condensed cycloparaffins, total saturates, benzenes naphthenebenzenes, di napthenebenzenes, napthalenes, acenaphthenes and dibenzofurans, fluorenes, phenanthrenes, napthalenes, acenaphthenes and dibenzofurans, fluorens phenanthrenes, naphthenephenthrenes, pyrenes, chryenes, perylenes, di benzanthracenes, dibenzothiophenes, naphthobenzothiophenens and total aromatics.

Note: All mass spectral data on each compound observed (both identified and unidentified) are catalogued on magnetic tape and can be recalled for inspection at any time.

SECTION I

DRY WEIGHT DISTRIBUTION OF ALKANES ISOLATED
FROM ZOOPLANKTON CALCULATED FROM GAS CHROMATOGRAPHIC DATA

pristane = 2, 6, 10, ?4 tetramethylpentadecane
phytane = 3, 7, 11, 15 tetramethylhexadecane
t = trace

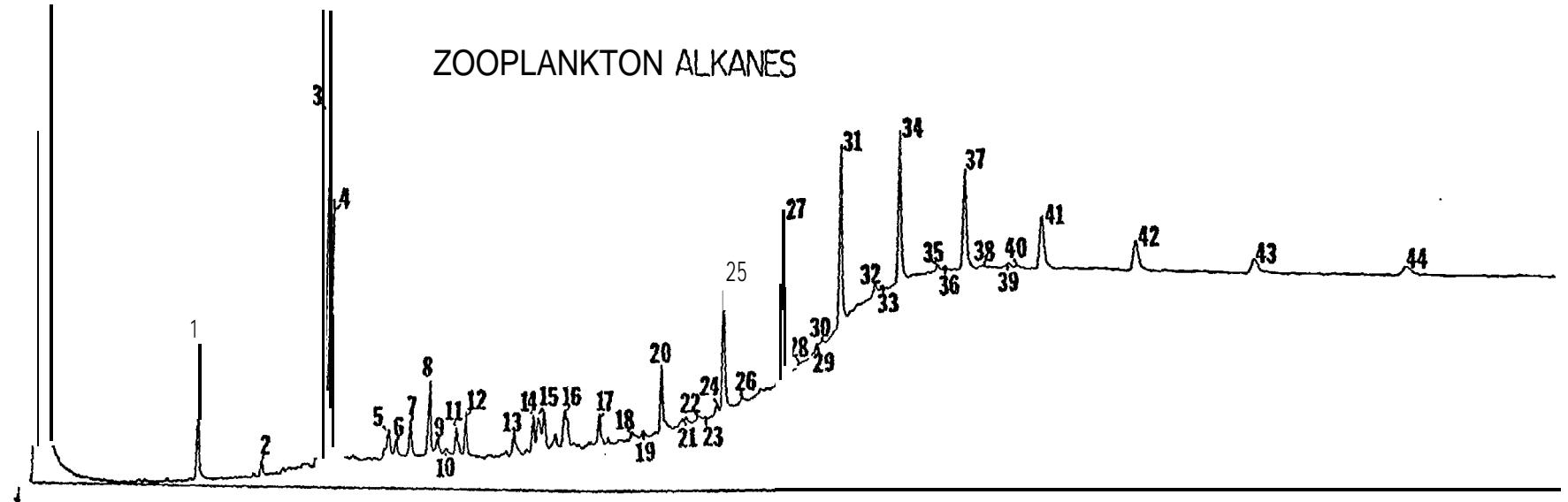


Table I
Sample Number 1

DRY WEIGHT DISTRIBUTION OF ALKANES ISOLATED
FROM ZOOPLANKTON CALCULATED FROM GAS CHROMATOGRAPHIC DATA

Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)	Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)
1	<u>n</u> -pentadecane	48.51	23	$\text{C}_{21}\text{H}_{42}$	0.58
2	<u>n</u> -hexadecane	3.51	24	$\text{C}_{23}\text{H}_{46}$	1.75
3	pristane	244.28	25	<u>n</u> -tricosane	43.25
4	<u>n</u> -heptadecane	57.86	26	unknown	2.34
5	phytane + $\text{C}_{20}\text{H}_{38}$	6.43	27	<u>n</u> -tetracosane	73.63
6	<u>n</u> -octadecane	3.51	28	unknown	1.17
7	$\text{C}_{20}\text{H}_{38}$	12.27	29	2-methyltetracosane	1.17
8	$\text{C}_{20}\text{H}_{38}$	16.36	30	3-methyltetracosane	1.17
9	$\text{C}_{21}\text{H}_{40}$	5.26	31	<u>n</u> -pentacosane	78.31
10	$\text{C}_{21}\text{H}_{40}$	2.93	32	2-methylpentacosane	1.75
11	unknown	7.60	33	3-methylpentacosane	1.17
12	<u>n</u> -nonadecane	10.52	34	<u>n</u> -hexacosane	66.62
13	$\text{C}_{21}\text{H}_{36}$	5.26	35	2-methylhexacosane	1.75
14	<u>n</u> -eicosane	8.18	36	3-methylhexacosane	1.17
15	$\text{C}_{19}\text{H}_{39}$	11.69	37	<u>n</u> -heptacosane	48.51
16	unknown	8.18	38	unknown	1.17
17	<u>n</u> -heneicosane	7.01	39	2-methylheptacosane	1.75
18	$\text{C}_{22}\text{H}_{44}$	1.75	40	3-methylheptacosane	0.58
19	$\text{C}_{20}\text{H}_{40}$	1.17	41	<u>n</u> -octacosane	11.69
20	<u>n</u> -docosane	15.19	42	<u>n</u> -nonacosane	16.36
21	unknown	1.75	43	<u>n</u> -triacontane	5.84
22	unknown	1.75	44	<u>n</u> -hentriacontane	5.26"

Table 1

Sample Number 2

DRY WEIGHT DISTRIBUTION OF ALKANES ISOLATED
FROM ZOOPLANKTON CALCULATED FROM GAS CHROMATOGRAPHIC DATA

Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)	Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)
1	<u>n</u> -pentadecane	1.73	23	$\text{C}_{21}\text{H}_{42}$	0.58
2	<u>n</u> -hexadecane	2.88	24	$\text{C}_{23}\text{H}_{46}$	1.15
3	pristane	225, 98	25	<u>n</u> -tricosane	13.23
4	<u>n</u> -heptadecane	8.63	26	unknown	1.15
5	phytane + $\text{C}_{20}\text{H}_{38}$	5.18	27	<u>n</u> -tetracosane	in. 35
6	<u>n</u> -octadecane	6.90	28	unknown	0.58
7	$\text{C}_{20}\text{H}_{38}$	--	29	2-methyl tetracosane	0.58
8	$\text{C}_{20}\text{H}_{38}$	--	30	3-methyltetracosane	0.58
9	$\text{C}_{21}\text{H}_{40}$	--	31	<u>n</u> -pentacosane	8.05
10	$\text{C}_{21}\text{H}_{40}$	1.73	32	2-methyl pentacosane	0.58
11	unknown	4.03	33	3-methylpentacosane	0.58
12	<u>n</u> -nonadecane	14.38	34	<u>n</u> -hexacosane	5.18
13	$\text{C}_{21}\text{H}_{36}$	1.15	35	2-methyl hexacosane t	
14	<u>n</u> -eicosane	18.40	36	3-methylhexacosane t	
15	C_9H_{38}	1.73	37	<u>n</u> -heptacosane	4.60
16	unknown	1.73	38	unknown	t
17	<u>n</u> -heneicosane	14.38	39	2-methyl heptacosane t	
18	$\text{C}_{22}\text{H}_{44}$	1.73	40	3-methyl heptacosane t	
19	$\text{C}_{20}\text{H}_{40}$	1.15	41	<u>n</u> -octacosane	4.60
20	<u>n</u> -docosane	7.48	42	<u>n</u> -nonacosane	1.73
21	unknown	1.15	43	<u>n</u> -triacontane	2.317
22	unknown	1.15	44	<u>n</u> -hentriacontane	--

Sample Number 3

DRY WEIGHT DISTRIBUTION OF ALKANES ISOLATED
FROM ZOOPLANKTON CALCULATED FROM GAS CHROMATOGRAPHIC DATA

Peak Number	Compound Identification	Dry Height ($\mu\text{g/g}$)	Peak Number	Compound Identification	Dry ($\mu\text{g/g}$) Weight
1	<u>n</u> -pentadecane	40.56	23	$\text{C}_{21}\text{H}_{42}$	1.67
2	<u>n</u> -hexadecane	6.11	24	$\text{C}_{23}\text{H}_{46}$	10.00
3	pristane	163.90	25	<u>n</u> -tricosane	50.56
4	<u>n</u> -heptadecane	35.56	26	unknown	5.56
5	phytane + $\text{C}_{20}\text{H}_{38}$	8.33	27	<u>n</u> -tetracosane	68.34
6	<u>n</u> -octadecane	8.33	28	unknown	2.78
7	$\text{C}_{20}\text{H}_{38}$	5.00	29	2-methyltetracosane	2.78
8	$\text{C}_{20}\text{H}_{38}$	8.89	30	3-methyltetracosane	4.44
9	$\text{C}_{21}\text{H}_{40}$	3.33	31	<u>n</u> -pentacosane	88.90
10	$\text{C}_{21}\text{H}_{40}$	2.22	32	2-methylpentacosane	6.11
11	unknown	5.00	33	3-methylpentacosane	6.67
12	<u>n</u> -nonadecane	16.67	34	<u>n</u> -hexacosane	137.79
13	$\text{C}_{21}\text{H}_{36}$	2.22	35	2-methylhexacosane	3.33
14	<u>n</u> -eicosane	11.11	36	3-methylhexacosane	2.22
15	$\text{C}_{19}\text{H}_{38}$	5.56	37	<u>n</u> -heptacosane	42.78
16	unknown	4.44	38	unknown	5.56
17	<u>n</u> -heneicosane	13.89	39	2-methylheptacosane	3.33
18	$\text{C}_{22}\text{H}_{44}$	5.00	40	3-methylheptacosane	0.56
19	$\text{C}_{20}\text{H}_{40}$	2.22	41	<u>n</u> -octacosane	32.23
20	<u>n</u> -docosane	27.78	42	<u>n</u> -nonacosane	22.22
21	unknown	5.56	43	<u>n</u> -triacontane	21.11
22	unknown	2.22	44	<u>n</u> -hentriacontane	10.00

Table I

Sample Number 4

DRY WEIGHT DISTRIBUTION OF ALKANES ISOLATED
FROM ZOOPLANKTON CALCULATED FROM GAS CHROMATOGRAPHIC DATA

Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)	Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)	Weight
1	<u>n</u> -pentadecane	5.45	23	$\text{C}_{21}\text{H}_{42}$	--	
2	<u>n</u> -hexadecane	8.56	24	$\text{C}_{23}\text{H}_{46}$	2.33	
3	pristane	275.34	25	<u>n</u> -tricosane	38.11	
4	<u>n</u> -heptadecane	39.67	26	unknown	--	
5	phytane + $\text{C}_{20}\text{H}_{38}$	3.11	27	<u>n</u> -tetracosane	57.56	
6	<u>n</u> -octadecane	3.11	28	unknown	--	
7	$\text{C}_{20}\text{H}_{38}$	3.11	29	2-methyltetracosane	0.78	
8	$\text{C}_{20}\text{H}_{38}$	5.45	30	3-methyl tetracosane	t	
9	$\text{C}_{21}\text{H}_{40}$	--	31	<u>n</u> -pentacosane	65.34	
10	$\text{C}_{21}\text{H}_{40}$	t	32	2-methylpentacosane	3.11	
11	unknown	0.78	33	3-methylpentacosane	0.78	
12	<u>n</u> -nonadecane	7.00	34	<u>n</u> -hexacosane	58.34	
13	$\text{C}_{21}\text{H}_{36}$	0.78	35	2-methylhexacosane	--	
14	<u>n</u> -eicosane	3.11	36	3-methyl hexacosane	1.56	
15	$\text{C}_{19}\text{H}_{38}$	--	37	<u>n</u> -heptacosane	0.78	
16	unknown	--	38	unknown	17.11	
17	<u>n</u> -heneicosane	5.45	39	2-methylheptacosane	13.22	
18	$\text{C}_{22}\text{H}_{44}$	--	40	3-methylheptacosane	6.22	
19	$\text{C}_{20}\text{H}_{40}$	--	41	<u>n</u> -octacosane	17.11	
20	<u>n</u> -docosane	17.89	42	<u>n</u> -nonacosane	13.22	
21	unknown	--	43	<u>n</u> -triacontane	6.22	
22	unknown	--	44	<u>n</u> -hentriacontane	3.11	

Sample Number 5

DRY WEIGHT DISTRIBUTION OF ALKANES ISOLATED
FROM ZOOPLANKTON CALCULATED FROM GAS CHROMATOGRAPHIC DATA

Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)	Peak Number	Compound Identification	Dry Weight ($\mu\text{g/g}$)
1	<u>n</u> -pentadecane	22.14	23	$\text{C}_{21}^{\circ} 42$	t
2	<u>n</u> -hexadecane	3.32	24	$\text{C}_{22}^{\circ} 3^{\text{H}} 4^{\text{H}} 6$	1.11
3	pristane	695.26	25	<u>n</u> -tricosane	64.21
4	<u>n</u> -heptadecane	55.36	26	unknown	1.11
5	phytane + $\text{C}_{20}^{\circ} \text{H}_{38}$	3.32	27	<u>n</u> -tetracosane	93.00
6	<u>n</u> -octadecane	4.43	28	unknown	1.11
7	$\text{C}_{20}^{\circ} \text{H}_{38}$	1.11	29	Z-methyl tetracosane	2.21
8	$\text{C}_{20}^{\circ} \text{H}_{38}$	3.32	30	3-methyl tetracosane	1.11
9	$\text{C}_{21}^{\circ} \text{H}_{40}$	--	31	<u>n</u> -pentacosane	104.07
10	$\text{C}_{21}^{\circ} \text{H}_{40}$	--	32	2-methyl pentacosane	5.54
11	unknown	1.11	33	3-methyl pentacosane	2.21
12	<u>n</u> -nonadecane	7.75	34	<u>n</u> -hexacosane	93.00
13	$\text{C}_{21}^{\circ} \text{H}_{36}$	4.43	35	Z-methyl hexacosane	4.43
14	<u>n</u> -eicosane	5.54	36	3-methyl hexacosane	2.21
15	$\text{C}_{19} \text{H}_{38}$	--	37	<u>n</u> -heptacosane	89.68
16	unknown	--	38	unknown	--
17	<u>n</u> -heneicosane	8.86	39	Z-methyl heptacosane	3.32
18	$\text{C}_{22}^{\circ} 44$	--	40	3-methyl heptacosane	1.11
19	$\text{C}_{20}^{\circ} \text{H}_{40}$	--	41	<u>n</u> -octacosane	45.39
20	<u>n</u> -docosane	32.11	42	<u>n</u> -nonacosane	23.25
21	unknown	1.11	43	<u>n</u> -triacontane	16.61
22	unknown	t	44	<u>n</u> -hentriacontane	8.86

A40115, #13, 9A-2, L-17, 012, TR-2.

1043.

L-57.

6,6577 99.3

AVERAGE MOLECULAR WEIGHT 226.

	VOLUME PCT	* ESTIMATED WEIGHT PCT
SATURATES	87.6	35.5
PARAFFINS	21.1	* 19.0
MONOCYCLOPARAFFINS	23.6	* 27.3
COND CYCLOPAR 2-RING	19.5	* 19.3
COND CYCLOPAR 3-RING+	18.1	* 19.4
AROMATICS	12.7	14.5
MONO-	7.6	5.0
BENZENES	3.5	* 3.5
NAPHTHENEBENZENES	2.3	* 2.4
DINAPHTHENEBENZENES	1.3	* 2.2
DI-	3.4	* 4.0
NAPHTHALENES	1.1	* 1.2
ACENAPHTHENES, ODFURANS	1.7	* 2.0
FLUORENES	0.7	* 0.8
TRI-	2.8	0.6
PHENANTHENES	0.3	* 0.2
NAPHTHEPENANTHENES	0.7	* 0.2
TETRA-	3.4	0.6
PYRENES	0.4	* 0.6
CHRYSENES	0.3	* 0.2
PENTA-	2.2	0.4
PERYLENES	0.3	* 0.2
DIBENZANTHRACENES	0.2	* 0.4
HEXOPHENONE-	0.2	0.3
DIBENZOTHIOPHENES	0.3	* 0.2
DIBENZOTOPHENES	0.2	* 0.3
NIDENTIFIED	0.0	1.2
CLASS I - NITRO AROMATIC	0.0	*
CLASS II	0.0	* 0.0
CLASS III	0.0	* 0.0
CLASS IV	0.0	* 0.0
CLASS V	0.0	* 0.0
CLASS VI	0.0	* 0.7
CLASS VII	1.0	*

DATE CALCULATED: 14-07-74

MASS SPECTRAL ANALYSIS OF PETROLEUM OILS

29

A45116-LJS3 MA-5 SHELL ROTELLA 3WT TF=220
 1579. 1464. 1.8645 100.0

AVERAGE MOLECULAR WEIGHT 226.

	VOLUME PCT	* ESTIMATED WEIGHT PCT.
SATURATES	62.3	78.4
PARAFFINS	20.3	* 17.8
NONCOND CYCLOPARAFFINS	27.5	* 26.1
COND CYCLOPAR 2-RING	16.4	* 16.5
COND CYCLOPAR 3-RING+	17.1	* 16.4
AROMATICS	15.2	21.6
MONO-	11.6	* 12.2
BENZENES	2.0	* 5.6
NAPHTHENE BENZENES	3.2	* 3.5
DINAPHTHENE BENZENES	2.0	* 3.2
DI-	5.3	* 6.3
NAPHTHALENES	1.7	* 1.9
ACENAPHTHENES, DHEFURANS	2.2	* 2.6
FLUORENES	1.5	* 1.8
TRI-	2.6	* 2.5
PHEVANTHENES	0.2	* 0.3
NAPHTHENE PHEVANTHENES	0.3	* 0.2
TETRA-	2.2	* 0.3
PYRENES	0.3	* 0.6
CHRYSENES	0.2	* 0.3
PENTA-	0.1	* 0.2
PERYLENES	0.1	* 0.1
DI(BENZANTHRACENES)	0.1	* 0.1
THIOPHENO-	2.7	* 1.2
BENZOTHIOPHENES	2.1	* 1.6
DIBENZOTHIOPHENES	0.5	* 0.4
NAPHTHODIENETHIOPHENES	0.1	*
UNIDENTIFIED	0.6	* 1.2
CLASS I - WITH NAPHTHENE		*
CLASS II	3.0	* 3.0
CLASS III	2.7	* 3.0
CLASS IV	3.0	* 2.2
CLASS V	0.1	* 1.1
CLASS VI	0.1	* 0.3
CLASS VII	0.6	*

DATE CALCULATED: 10-01-74

MASS SPECTRAL ANALYSIS OF PETROLEUM OILS

H40998.C.3 DIESEL MA-6 PROBE

2632.

1427.

0.9008 95.5

AVERAGE MOLECULAR WEIGHT 220.

	VOLUME PCT	* ESTIMATED WEIGHT PCT
SATURATES	58.3	53.7
PARAFFINS	19.5	* 16.6
NONCOND CYCLOPARAFFINS	18.7	* 17.0
COND CYCLOPAR 2-RING	12.3	* 10.0
COND CYCLOPAR 3-RING+	9.9	* 10.1
AROMATICS	41.7	46.3
MONO-	12.5	* 12.6
BENZENES	4.0	* 3.8
NAPHTHENOBENZENES	3.0	* 3.9
DINAPHTHENOBENZENES	4.7	* 4.8
DI-	23.7	* 26.6
NAPHTHALENES	11.4	* 12.2
ACENAPHTHENES, DIFURANS	8.1	* 9.3
FLUORENES	4.2	* 5.1
TRI-	3.2	* 4.3
PHENANTHENES	2.1	* 3.5
NAPHTHENEPHENANTHENES	4.6	* 0.7
TETRA-	0.3	* 0.4
PYRENES	0.5	* 0.4
CHRYSENES	0.1	* 0.0
PENTA-	1.1	* 1.1
PERYLENES	0.1	* 0.1
DIBENZANTHRACENES	0.3	* 0.2
THIOPHENES	1.8	* 2.3
BENZOTHIOPHENES	1.3	* 1.5
DIBENZOTHIOPHENES	0.6	* 0.8
NAPHTHOSENZOTHIOPHENES	0.3	* 0.0
UNIDENTIFIED	9.0	* 9.3
CLASS I - WITH NAPPHENAN		*
CLASS II	2.1	* 0.2
CLASS III	2.2	* 0.0
CLASS IV	2.1	* 0.0
CLASS V	2.2	* 0.0
CLASS VI	2.2	* 0.0
CLASS VII	2.1	*

DATE CALCULATED: 16-30-74

A42117.804 MA-7 HYDRAULIC OIL TP=78
1755. 1596.

0.9201 120.4

AVERAGE MOLECULAR WEIGHT 226.

	VOLUME PCT	* ESTIMATED WEIGHT PCT
SATURATES	70.2	54.2
PARAFFINS	18.5	* 15.5
NONCOND CYCLOPARAFFINS	21.2	* 15.9
COND CYCLOPAR 2-RING	13.1	* 12.4
COND CYCLOPAR 3-RING*	17.4	* 17.4
AROMATICS	29.3	35.8
MONO-	10.6	* 10.4
BENZENES	4.3	* 4.0
NAPHTHENE BENZENES	3.3	* 3.3
DINAPHTHENE BENZENES	3.2	* 3.1
DI-	2.5	* 2.7
NAPHTHALENES	1.0	* 1.0
ACENAPHTHENES, DIFURANS	1.5	* 1.7
FLUORENES	0.8	* 0.8
TRI-	5.0	* 6.6
PHEANTHENES	2.7	* 3.4
NAPHTHENE PHENANTHENES	2.3	* 3.1
TETRA-	0.0	* 0.0
PYRENES	0.0	* 0.0
CHRYSENES	0.0	* 0.0
PENTA-	3.0	* 4.3
PERYLENES	0.0	* 0.0
DIHYNZANTHRACENES	0.0	* 0.0
THIOPHENO-	1.0	* 1.9
BENZOTHIOPHENES	1.5	* 1.8
DI BENZOTHIOPHENES	0.0	* 0.1
NAPHTHENE BENZOTHIOPHENES	0.0	* 0.0
UNIDENTIFIED	7.1	* 10.1
CLASS I WITH NAPHTHENES		
CLASS II	1.2	* 1.7
CLASS III	0.4	* 0.6
CLASS IV	0.0	* 0.0
CLASS V	1.0	* 1.0
CLASS VI	0.0	* 0.0
CLASS VII	0.0	* 0.0

DATE CALCULATED: 15-01-74

A40118.633 MA-8 FUEL R/V FREEPORT TP=AMBIENT
955. 932.

5.8546 92.7

AVERAGE MOLECULAR WEIGHT 226.

	VOLUME PCT	* ESTIMATED WEIGHT PCT
SATURATES	62.5	73.5
PARAFFINS	37.4	* 34.5
NONCOND CYCLOPARAFFINS	24.7	* 24.2
COND CYCLOPAR 2-RING	11.3	* 11.8
COND CYCLOPAR 3-RING+	7.2	* 8.0
AROMATICS	19.4	21.5
MONO-	10.5	* 11.3
BENZENES	5.3	* 5.4
NAPHTHENE BENZENES	3.1	* 3.5
DINAPHTHENE BENZENES	2.1	* 2.4
DI-	7.5	* 3.9
NAPHTHALENES	5.1	* 0.0
ACENAPHTHENES, DBZFURANS	2.2	* 2.5
FLUORENES	0.4	* 0.5
TRI-	0.2	* 0.2
PHEANTHENES	0.2	* 0.2
NAPHTHENEPHENANTHENES	0.2	* 0.3
TETRA-	0.0	0.0
PYRENES	0.3	* 0.0
CHRYSENES	0.0	* 0.0
PENTA-	0.2	* 0.0
PERYLENES	0.0	* 0.0
DIBENZANTHRACENES	0.0	* 0.0
THIOPHENO-	0.7	* 1.0
BENZOTHIOPHENES	0.3	* 0.4
DIBENZOTHIOPHENES	0.4	* 0.5
NAPHTHOBENZOTHIOPHENES	0.0	* 0.0
UNIDENTIFIED	0.2	* 0.2
CLASS I WITH NAPPHNE	0.0	* 0.0
CLASS II	0.0	* 0.0
CLASS III	0.0	* 0.0
CLASS IV	0.0	* 0.0
CLASS V	0.0	* 0.0
CLASS VI	0.0	* 0.0
CLASS VII	0.0	* 0.0

DATE CALCULATED: 15-01-74

1495.

1375.

6.8816 93.5

AVERAGE MOLECULAR WEIGHT 242,

	VOLUME PCT	* ESTIMATED WEIGHT PCT
SATURATES	80.6	76.1
PARAFFINS	29.1	25.7
NONCOND CYCLOPARAFFINS	23.6	22.2
COND CYCLOPAR 2-RING	12.7	12.6
COND CYCLOPAR 3-RING+	15.2	15.8
AROMATICS		
MONO-	19.4	23.9
BENZENES	5.7	5.8
NAPHTHENE BENZENES	1.9	1.8
DINAPHTHENE BENZENES	2.4	2.1
DI-		
NAPHTHALENES	1.3	1.9
ACENAPHTHENES, OXOFURANS	4.1	4.9
FLUORENES	0.5	0.5
0.3	0.9	
2.9	3.5	
TRI-		
PHENANTHENES	4.1	5.5
NAPHTHENEPHENANTHENES	2.6	3.3
TETRA-		
PYRENES	1.5	2.2
CHRYSENES	0.8	0.2
PENTA-		
PERYLENES	0.6	0.9
DI-BENZANTHRACENES	0.1	0.1
THIOPHENO-		
BENZOTHIOPHENES	2.9	1.1
DI-BENZOTHIOPHENES	0.9	1.1
NAPHTHALENETHIOPHENES	0.0	0.3
0.4	0.4	
UNIDENTIFIED		
CLASS I WITH NAPHTHENES	3.1	4.5
CLASS II	1.3	
CLASS III	2.1	2.2
CLASS IV	0.4	0.5
CLASS V	1.7	0.3
CLASS VI	0.5	1.6
CLASS VII	1.5	

DATE CALCULATED: 15-01-74

A40122-211 NA-15 SILICE OIL

1458.

1360.

6.6416 9c.1

AVERAGE MOLECULAR WEIGHT 226.

	VOLUME PCT	% ESTIMATED	% WEIGHT PCT
SATURATES	92.6	*	39.3
PARAFFINS	23.3	*	21.7
NONCOND CYCLOPARAFFINS	23.3	*	27.3
COND CYCLOPAR 2-RING	25.2	*	23.1
COND CYCLOPAR 3-RING+	13.0	*	14.2
AROMATICS	10.0	*	12.7
MONO-	5.1	*	5.4
BENZENES	2.9	*	3.0
NAPHTHENE BENZENES	1.7	*	1.8
DINAPHTHENE BENZENES	0.5	*	2.6
DI-	1.8	*	2.2
NAPHTHALENES	0.5	*	0.5
ACENAPHTHENES, DIFURANS	1.1	*	1.4
FLUORENES	0.2	*	0.3
TRI-	1.4	*	1.9
PHEANTHRENES	1.4	*	1.9
NAPHTHENEPHENANTHRENES	0.0	*	0.0
TETRA-	0.0	*	0.1
PYRENES	0.0	*	0.1
CHRYSENES	0.0	*	0.0
PENTA-	0.7	*	1.1
PERYLENES	0.7	*	1.1
DI-PHENANTHRENES	0.3	*	0.0
THIOPHENES	0.0	*	0.0
BENZOTHIOPHENES	0.0	*	0.0
DIBENZOTHIOPHENES	0.0	*	0.0
NAPHTHOBENZOTHIOPHENES	0.0	*	0.0
UNIDENTIFIED	0.0	*	0.0
CLASS I WITH NAPHTHENES	0.0	*	0.0
CLASS II	0.0	*	0.0
CLASS III	0.0	*	0.0
CLASS IV	0.0	*	0.0
CLASS V	0.0	*	0.0
CLASS VI	0.0	*	0.0
CLASS VII	0.0	*	0.0

DATE CALCULATED: 12-31-74

A43121.030 MA-11 HYDRAULIC THERM - 1680 RUN
 1555. 1144. 0.8564 96.4

AVERAGE MOLECULAR WEIGHT 226.

	VOLUME PCT	* ESTIMATED WEIGHT PCT
SATURATES	89.0	87.3
PARAFFINS	23.7	* 21.4
NONCOND CYCLOPARAFFINS	26.1	* 24.9
COND CYCLOPAR 2-RING	18.2	* 18.5
COND CYCLOPAR 3-RING+	21.1	* 22.6
AROMATICS	11.0	12.7
MONO-	5.2	5.4
BENZENES	3.1	* 3.0
NAPHTHENE BENZENES	1.1	* 1.2
DINAPHTHENEBENZENES	1.1	* 1.1
DI-	4.4	5.3
NAPHTHALENES	1.5	* 1.7
ACENAPHTHENES, DIFURANS	1.3	* 2.2
FLUORENES	1.1	* 1.4
TRI-	0.9	1.2
PHENANTHENES	0.4	* 0.6
NAPHTHENEPHENANTHENES	0.5	* 0.7
TETRA-	0.0	0.0
PYRENES	0.0	* 0.0
CHRYSENES	0.0	* 0.0
PENTA-	0.0	0.0
PERYLLENES	0.1	* 0.0
DIPIPERANTHRACENES	0.1	* 0.0
THIOPHENES-	0.3	* 0.5
BENZOTHIOPHENES	0.2	* 0.2
DIBENZOTHIOPHENES	0.1	* 0.2
NAPHTHENETHIOPHENES	0.1	* 0.0
UNIDENTIFIED	0.2	0.3
CLASS I WITH NAPPHENES		
CLASS II	0.1	* 0.0
CLASS III	0.1	* 0.0
CLASS IV	0.1	* 0.0
CLASS V	0.1	* 0.0
CLASS VI	0.1	* 0.0
CLASS VII	0.1	*

DATE CALCULATED: 16-SP-74

A40120, P-10 MA-12 HYDRAULIC TF=1.0 PROB# R01
1720, 1973.

4,6947 93.2

AVERAGE MOLECULAR WEIGHT 225.

	VOLUME PCT	* ESTIMATED WEIGHT PCT
SATURATES	75.0	73.9
PARAFFINS	19.5	* 16.8
NONCOND CYCLOPARAFFINS	24.2	* 22.1
COND CYCLOPAR 2-RING	17.9	* 17.4
COND CYCLOPAR 3-RING+	17.0	* 17.5
AROMATICS	21.4	25.1
MONO-	4.7	* 4.8
BENZENES	1.4	* 1.3
NAPHTHENEBENZENES	1.6	* 1.6
DINAPHTHENEBENZENES	1.6	* 1.9
DI-	7.3	8.5
NAPHTHALENES	1.1	* 1.2
ACENAPHTHENES, DIFURANS	3.6	* 4.1
FLUORENES	2.6	* 3.1
TRI-	3.2	4.3
PHENANTHRENES	1.1	* 1.4
NAPHTHENEPHENANTHRENES	2.1	* 2.6
TETRA-	0.9	1.3
PYRENES	0.9	* 1.3
CHRYSENES	0.0	* 0.2
PENTA-	0.9	1.3
PERYLENES	0.9	* 1.3
DIBENZANTHRACENES	0.1	* 0.1
THIOPHENES	2.3	2.9
BENZOTHIOPHENES	1.4	* 1.6
DIBENZOTHIOPHENES	0.0	* 0.1
NAPHTHOBENZOTHIOPHENES	0.0	* 0.0
UNIDENTIFIED	2.1	3.1
CLASS I WITH NAPHTHENES	0.3	* 0.3
CLASS II	0.3	* 0.3
CLASS III	0.2	* 0.3
CLASS IV	0.3	* 0.3
CLASS V	0.1	* 0.1
CLASS VI	1.2	* 0.2
CLASS VII	0.3	* 0.3

DATE CALCULATED: 15-07-74

LUBRICATING OIL ALKANES
RIV TURSIOPS

